european downstream oil industry safety performance

statistical summary of reported incidents - 1993 & 1994

Prepared for the CONCAWE Safety Management by the Special Task Force on Safety Statistics (S/STF-5)

C. George (Chairman)

L. Andersson
P. Berckmoes
G. De Cecco
J-P. Jacquet
G. Meizer
R. Pescott
M. Van Reeth

D.E. Martin (Technical Coordinator)

Brussels
May 1996

ABSTRACT

This report is the first by CONCAWE reviewing the safety performance of the downstream oil industry in Western Europe. It includes the results of 17 companies which together represent over 70% of the oil refining capacity in Europe. As such, it should be regarded as a representative sample of the industry rather than a complete picture. To allow for this, and for incomplete data from some companies, most results are quoted as frequencies.

The data covers the years 1993 and 1994. Overall, the reported hours worked by company staff and contractors were about 360 million with average Lost Workday Injury Frequencies (LWIF) of 4.7 in 1993 and 4.0 in 1994 (per million hours worked). A range of other measures of safety performance are also reported. The responsible management of safety in the oil industry resulted in a low level of accidents despite the intrinsic hazards of the materials handled and the operations carried out.

In general, the safety performance for the companies reporting was better in 1994 than 1993. However, conclusions as to whether this indicates an improving trend cannot be made on two years figures. It is intended to continue this exercise so that a long-term trend can be established.

KEYWORDS

Accidents, AIF, CONCAWE, fatality, incidents, injury, LWI, LWIF, marketing, oil industry, refining, RWI, safety, statistics

CONTENTS

SUMMARY

The importance of collecting and analysing accident data to measure safety performance is recognised throughout the oil industry. A number of key statistics have been identified which are measured by the majority of oil companies operating in Western Europe.

Seventeen companies operating in the downstream oil industry in Western Europe submitted statistics for this CONCAWE report on safety performance. These seventeen companies represent over 70% of the refining capacity in Europe. The data covers the years 1993 and 1994 and is for both the Manufacturing (Refining) and Marketing sectors of the industry.

Not all companies operate in both the manufacturing and marketing areas, nor do they all collect the full range of data requested. To allow for this fact, nearly all the data is reported in terms of incident frequencies. The figures therefore, provide a reasonably representative measure of downstream industry safety performance

The accident data collected from CONCAWE members for 1993 and 1994 is summarised in **Appendix 2** and the range of results expressed in graphical format is shown in **Appendix 3**. The CONCAWE statistics are compared with those collected for the USA (by API) and for the upstream industry (by E&P Forum) in **Appendix 4**.

Accident frequencies are now at historical all time low levels. Although not quantified in this report, the majority of companies advised that their safety performance had shown a steady year on year improvement prior to the years sampled. This trend of improvement continued in 1993 and 1994. From the data submitted it is apparent that there are considerable variations in the results reported by individual companies. Such variations provide a valuable pointer for member companies to identify areas for improvement.

This project will be repeated regularly and it is hoped that in future years more companies will provide their data and a more complete survey can be achieved.

1. INTRODUCTION

This report represents statistical data relating to safety performance in the downstream oil industry in Western Europe. The data was collected by a CONCAWE task force (S/STF-5), which was set up for this purpose. The purpose of collecting the information was twofold:

- to allow member companies to compare their performance against industry norms (*ie* benchmark) so that they could determine the efficacy of their management systems and highlight any deficiencies so that corrective action could be taken.

- to demonstrate that the responsible management of Safety in the downstream oil industry results in a low level of accidents despite the hazards intrinsic to its operations.

To achieve these ends, the task force was requested to collect and report on what type of safety statistics member companies collect for themselves and to use this to collect information on statistics on the frequency, severity and causes of accidents in the downstream oil industry. This was to be in a format that CONCAWE can use to collect and distribute accident data on a regular basis. The preparation of definitions of the terms to be used in the survey and hence reported on was an important element of the work. Although it was recognised that not all companies use the same methods at present, publication of agreed definitions would encourage companies to collect the information in this format in future.

2. RANGE OF STATISTICS COLLECTED

Not all companies measure their safety performance in the same way or collect the same statistics. A first task was to establish a set of definitions which would be acceptable to the majority of companies and require a minimum of additional effort. The definitions agreed are set out in **Appendix 1**. The key safety performance statistics collected were :

- Lost Workday Injury Frequency (LWIF)
- LWI Severity (days lost per accident)
- All Injury Frequency (AIF)
- Road Accident Rate (RAR)
- Fatalities

The data survey provided a detailed breakdown of key safety statistics. These were split between:

- employees
- contractors

and also between:

- manufacturing (refining)
- marketing including all non refining activities including “Head Office” staff.

Companies were circulated with a request form (**Appendix** 5) and asked to submit figures for 1993 and 1994.

Seventeen member companies responded, approximately half the CONCAWE membership, representing over 70% of the European refining capacity. It was notable that the majority of these were willing for their data to be shared openly with other companies. This free exchange indicates that they felt that they could both learn from the experience of others and help other companies even though they are competitors. To take account of the fact that not all companies could supply data in all of the sections the results are expressed in terms of frequencies per hours worked.

3. FINDINGS

The safety performance data requested was chosen on the basis of its significance. However, the range actually collected varies considerably from company to company. Despite this, it was possible to identify some core statistics which are collected by the majority of companies in Western Europe. Furthermore, the task force were able to collect data which enabled a detailed statistical breakdown between Manufacturing and Marketing functions and between Employees and Contractors.

It is believed that accident frequencies are now at historical all time low levels. Although not quantified in this report, the majority of companies advised that their safety performance had shown a steady year on year improvement prior to the years sampled. This trend of improvement continued in 1993 and 1994.

From the data submitted it is apparent that there are considerable variations in the results reported by individual companies. Such variations provide a valuable pointer for member companies to identify areas for improvement. A number of companies who responded to the survey indicated that they intend to increase the range of statistics they collect in future years. Consequently, the data collected will become increasingly more representative of the industry as a whole.

The aggregated accident data collected from CONCAWE members for 1993 and 1994 is summarised in **Appendix 2** and the range of results expressed in graphical format is shown in **Appendix 3**. It should be noted that in these figures, a zero result can mean either the frequency was zero or that no data was reported for this determinand.

Overall safety performance improvement is evident for the two years covered in the survey. The reported hours worked for employees and contractors, were about 360 million in each year.

All companies without exception collect employee Lost Workday Injury Frequency (LWIF) data and this is therefore the most representative statistic of all.

3.1. LOST WORKDAY INJURY FREQUENCY (LWIF)

The LWIF calculated overall was 4.7 in 1993 falling to 4.0 in 1994. The performance of individual companies varied widely around the average. There is no significant difference in the overall safety performance of contractors against employees but it should be noted that contractors operating in refineries have a significantly poorer record than employees. This is reversed in the case of marketing contractors who recorded a lower LWIF than employees. It could be that the reporting of contractor accidents in the marketing functions is less reliable. This is possibly the case where they are operating remotely, away from direct company control. Therefore it is necessary to exercise caution in the interpretation of contractor data.

There has been a trend in recent years for more and more oil industry activities to be carried out by specialist contractors and there has been a fear that this could lead to poorer safety performance. Member companies are taking great strides to ensure that contracting companies are applying the same high standards as themselves.

3.2. LWI SEVERITY (LWIS)

LWI Severity as measured by the number of days lost per incident has shown a slightly improving trend falling from 25.7 days in 1993 to 23.2 days in 1994.

3.3. ALL INJURY FREQUENCY (AIF)

All Injury Frequency becomes a more meaningful measure of safety performance as LWIF declines to the low levels now experienced. AIF enables us to get a better picture of the total safety performance of the industry since it records fatalities, restricted work injuries and medical treatment cases in addition to lost workday injuries. AIF improved slightly from 8.1 to 7.9 between 1993 and 1994. However, it should be noted that not all companies collect full statistics for all these categories. In addition, not all companies or countries operate the restricted work system.

3.4. ROAD ACCIDENT RATE (RAR)

Road Accident Rate data was supplied by only seven of the 17 companies who participated in the survey. There was an improvement in RAR from 3.8 to 3.1 between 1993 and 1994. The seven companies who reported recorded that their vehicles travelled 227 million kilometres in 1994 and were involved in 706 accidents ranging from minor to major. Road accidents are receiving increased attention from member companies and it is to be expected that more companies will submit data in future years.

3.5. FATALITIES

18 fatalities occurred in 1993 (4 employees, 14 contractors) and 20 (16 employees and 4 contractors) in 1994. There are no predictable patterns or trends although it should be noted that transport related accidents were a consistent feature in both years. Due to their unpredictability, fatalities are not a reliable indicator of safety performance. The increased attention to preventing road accidents will hopefully improve the fatal accident record of the industry.

In 1994 almost half of the recorded fatalities were as a result of only one incident; nine company employees tragically lost their lives as a result of the sinking of the ferry *Estonia* in the Baltic.

3.6. COMPARISONS WITH OTHER INDUSTRIES AND AREAS

Comparison of oil industry safety performance with other industries in Europe has proved difficult as in general safety statistics are either not collected or are not available on a Europe-wide basis. E&P forum do collect a limited range of statistics for the upstream oil industry, including figures for Western Europe. [1]

Their operations differ considerably from the downstream oil business and comparisons should be made with caution. Nonetheless, downstream safety performance compares favourably with exploration and production.

The only other area where comparable downstream data is available is for the US. Annually the API collate data on US occupational injuries, illnesses and fatalities for the petroleum industry. [2] Approximately 180-200 companies submit data to API

each year on a voluntary basis. It should also be noted that API data is for company employees only and contractor statistics are not recorded.

The CONCAWE statistics are compared with those collected for the USA (by API) and for the upstream industry (by E&P Forum) in **Appendix 4**. The LWIS reported in the CONCAWE survey is comparable with the severity rates recorded by the API and E&P Forum.

It is interesting to note that the European AIF rates are significantly lower than the US rates, particularly in the marketing sector. The reasons for this are not fully understood as ostensibly both CONCAWE and API statistics are based on the same OSHA definitions to describe LWIs, restricted work injuries and medical treatment cases.

4. REFERENCES

1. E&P Forum (1994) E&P Forum accident data 1993. Report No. 6.47/230. London: E&P Forum

2. API (1995) Summary of US occupational injuries, illnesses and fatalities in the petroleum industry - 1994. API Publication. Washington DC: American Petroleum Institute

APPENDIX 1. *EUROPEAN OIL INDUSTRY STATISTICS*

DEFINITIONS AND GUIDING NOTES

1. Hours worked	Hours worked by employees and contractors. Estimates should be used where contractor data is not available.
2. Fatality	This is a death resulting from a work related injury where the injured person dies within twelve months of the injury.
3. LWI	Lost Workday Injury is a work related injury that causes the injured person to be away from work for at least one normal shift because he is unfit to perform any duties.
4. Total days lost	The number of calendar days lost through LWIs counting from the day after the injury occurred.
5. RWI	Restricted Workday Injury is a work related injury which causes the injured person to be assigned to other work on a temporary basis or to work his normal job less than full time or to work at his normal job without undertaking all the normal duties.
6. MTC	Medical Treatment Case is a work related injury which requires the attention of a medical practitioner. It excludes first aid Treatment.
7. AIF	All Injury Frequency which is calculated from the sum of Fatalities, LWIs, RWIs and MTCs divided by number of hours worked expressed in millions.
8. LWIF	Lost Workday Injury Frequency is calculated from the number of LWIs divided by the number of hours worked expressed in millions.
9. LWI Severity	The total number of days lost as a result of LWIs divided by the number of LWIs.
10. Distance travelled	This is the distance, expressed in millions of kilometres, covered by company owned delivery vehicles and company cars whether leased or owned. It should also include kilometres travelled in employee's cars when on company business.
11. Road Accidents	Any accident involving any of the vehicles described above.
12. RAR	Road Accident Rate is calculated from the number of accidents divided by the kilometres travelled expressed in millions .

Statistics to be collected under two groupings : Refineries and Marketing.

Marketing includes all non refining activities including "Head Office" personnel.

Where data is not available the best estimate possible should be made.

APPENDIX 2. *EUROPEAN OIL INDUSTRY SAFETY STATISTICS*

Table1 Aggregated Results for Seventeen Companies - 1993

Sector	Manufacturing		Marketing		Total		
Work Force	Own Staff	Contractor	Own Staff	Contractor	Own Staff	Contractor	All Workers
Total hours worked	74955979	37792324	166737128	76662781	241693107	114455105	356148212
Number of fatalities	2	8	2	6	4	14	18
Number of LWIs	288	207	947	222	1235	429	1664
Total days lost through LWIs	14360	3454	21199	3737	35559	7191	42750
Number of RWIs	110	69	87	4	197	73	270
Number of MTCs	443	242	220	44	663	286	949
AIF	11.2	13.9	7.5	3.6	8.7	7.0	8.1
LWIF	3.8	5.5	5.7	2.9	5.1	3.7	4.7
LWI Severity (Days/LWI)	50.0	16.7	21.8	16.8	29.0	16.8	25.7
Distance travelled (million km)	4.6		247		251.7		
Number of Road Accidents	10		953		963		
Road Accident Rate	2.2		3.9		3.8		

Table2 Aggregated Results for Seventeen Companies - 1994

Sector	Manufacturing		Marketing		Total		
Work Force	Own Staff	Contractor	Own Staff	Contractor	Own Staff	Contractor	All Workers
Total hours worked	75368491	42534250	162143078	80161503	237511569	122695753	360207322
Number of fatalities	3	2	13	2	16	4	20
Number of LWIs	221	221	833	177	1054	398	1452
Total days lost through LWIs	6108	5859	17583	4146	23691	10005	33696
Number of RWIs	106	124	76	23	182	147	329
Number of MTCs	355	167	405	100	760	267	1027
AIF	9.1	12.1	8.2	3.8	8.5	6.7	7.9
LWIF	2.9	5.2	5.1	2.2	4.4	3.2	4.0
LWI Severity (Days/LWI)	28.0	27.0	21.0	23.0	22.0	25.0	23.2
Distance travelled (million km)	3.68		223.02		226.7		
Number of Road Accidents	1		705		706		
Road Accident Rate	0.3		3.2		3.1		

APPENDIX 3 GRAPHS SHOWING SPREAD OF DATA

Figure 1 Fatalities for All Workers in European Oil Industry (Both Sectors)

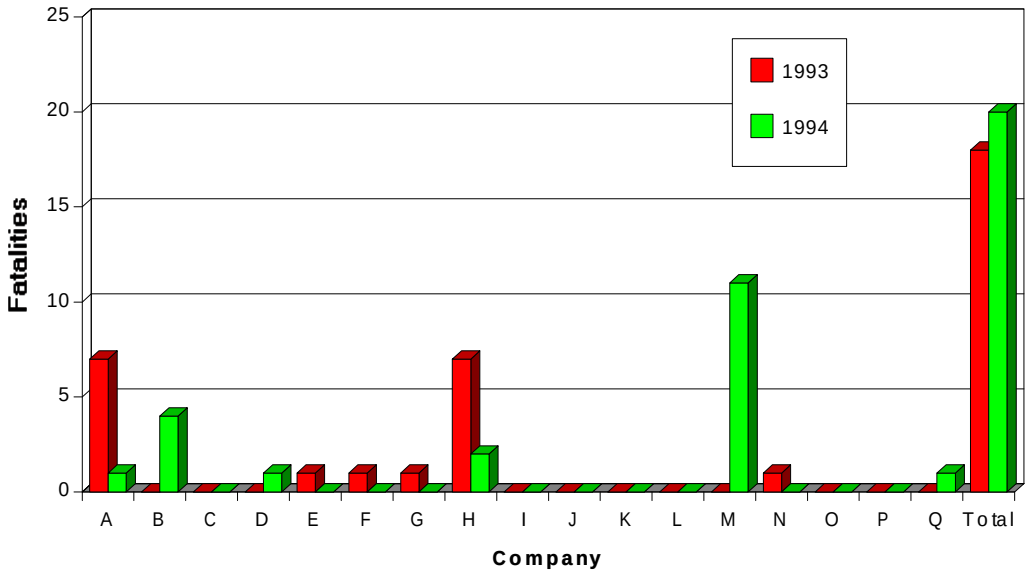


Figure 2 LWIF For Company Employees in European Oil Industry (Both Sectors)

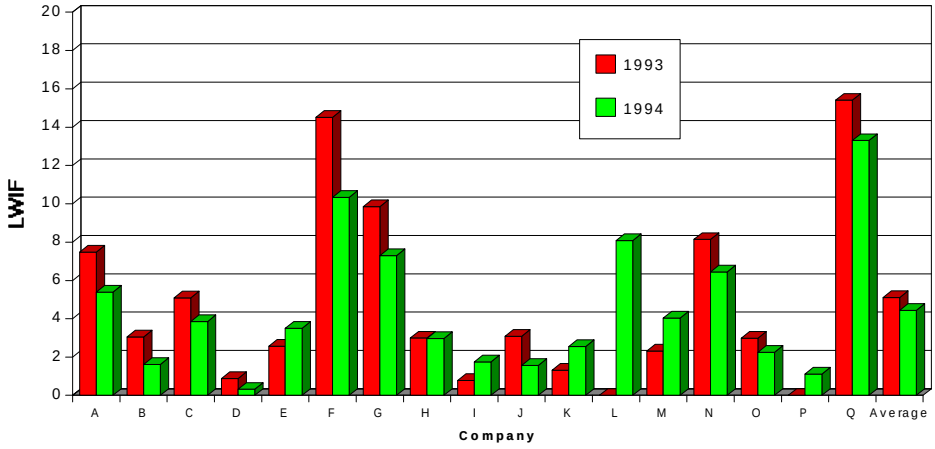


Figure 3 LWIF For Company Employees in European Oil Industry (Manufacturing)

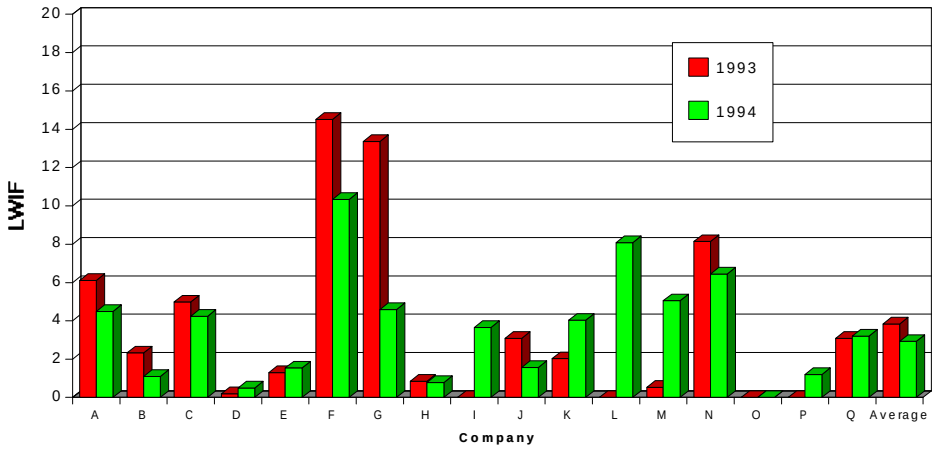


Figure 4 LWIF For Company Employees in European Oil Industry (Marketing)

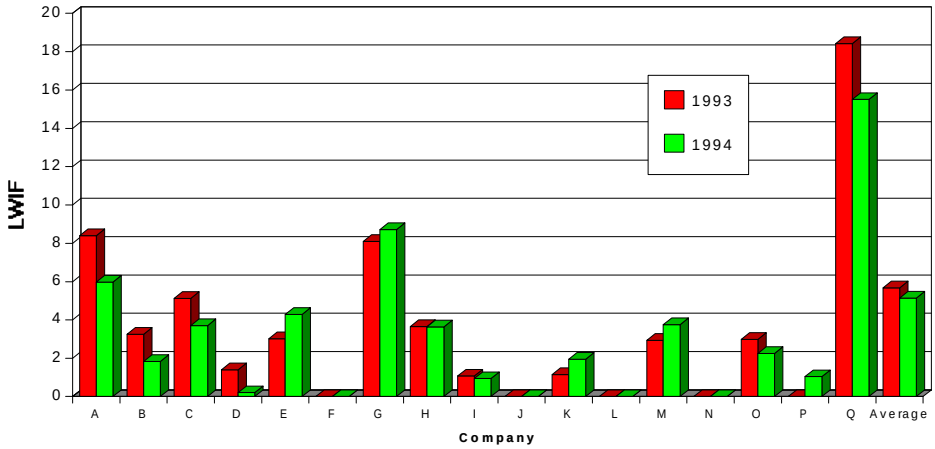


Figure 5 AIF For Company Employees in European Oil Industry (Both Sectors)

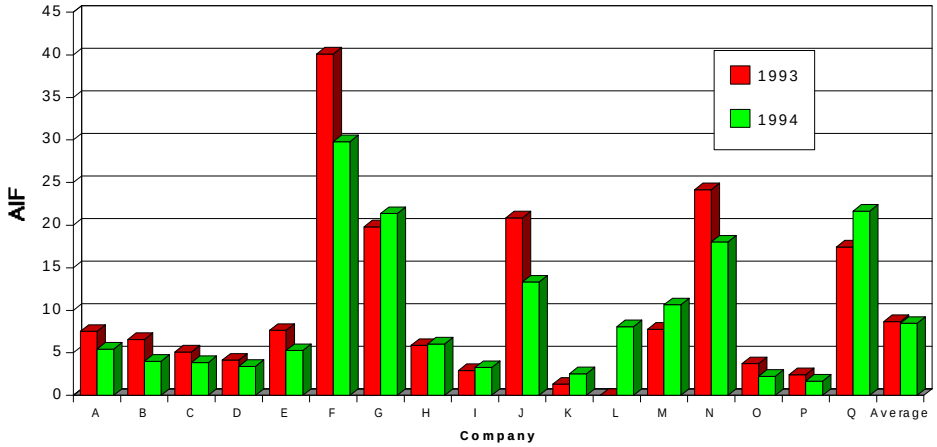


Figure 6 AIF For Company Employees in European Oil Industry (Manufacturing)

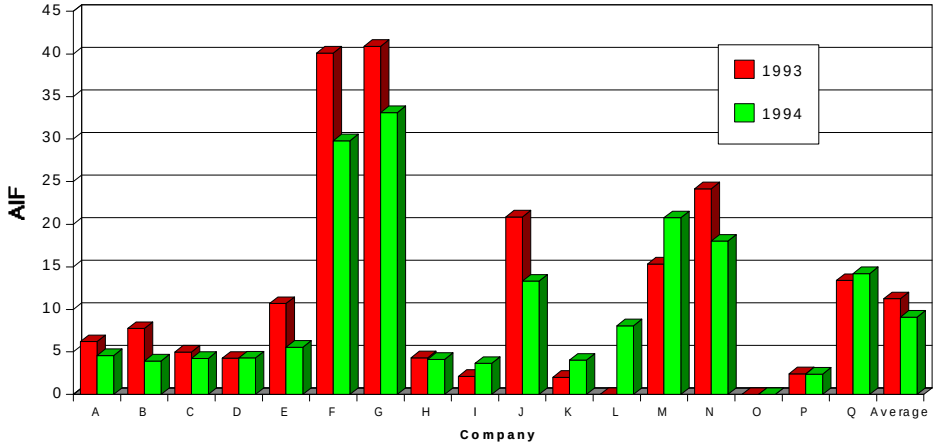


Figure 7 AIF For Company Employees in European Oil Industry (Marketing)

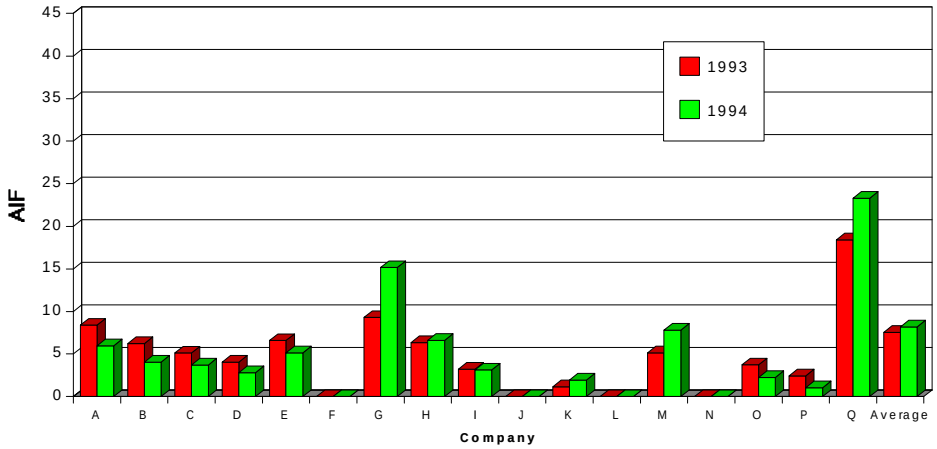


Figure 8 LWIF For Contractors in European Oil Industry (Both Sectors)

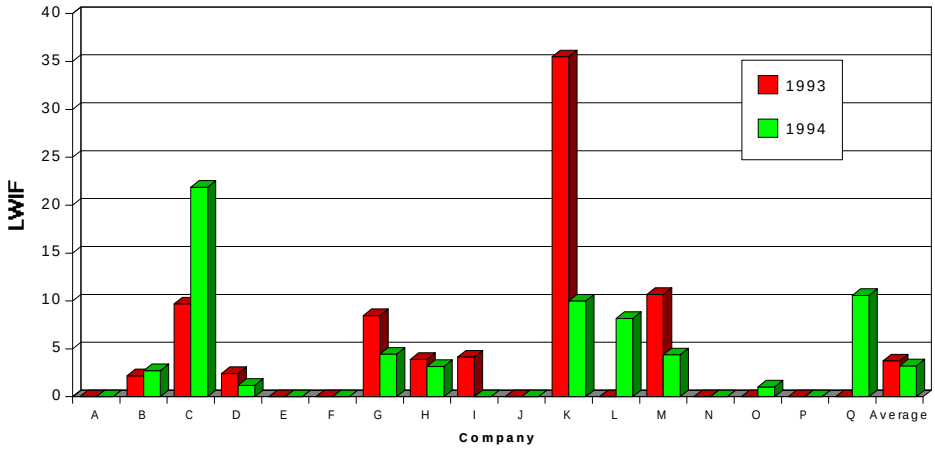


Figure 9 LWIF For Contractors in European Oil Industry (Manufacturing)

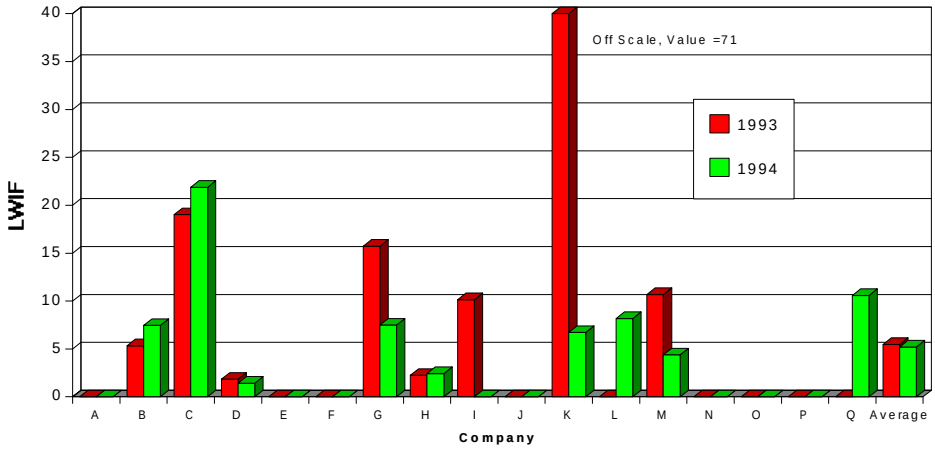


Figure 10 LWIF For Contractors in European Oil Industry (Marketing)

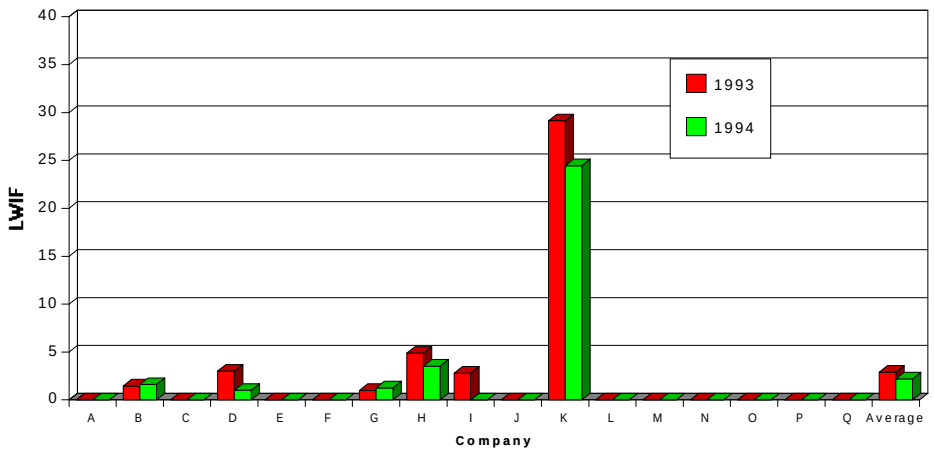


Figure 11 AIF For Contractors in European Oil Industry (Both Sectors)

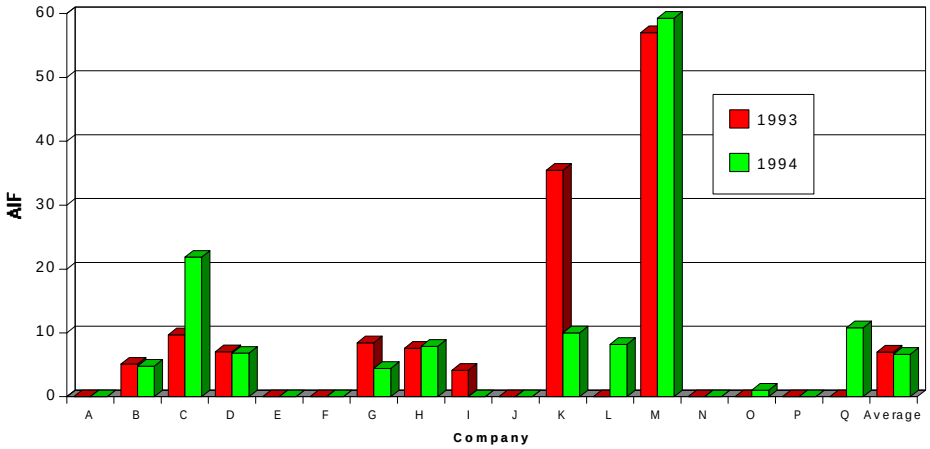


Figure 12 AIF For Contractors in European Oil Industry (Manufacturing)

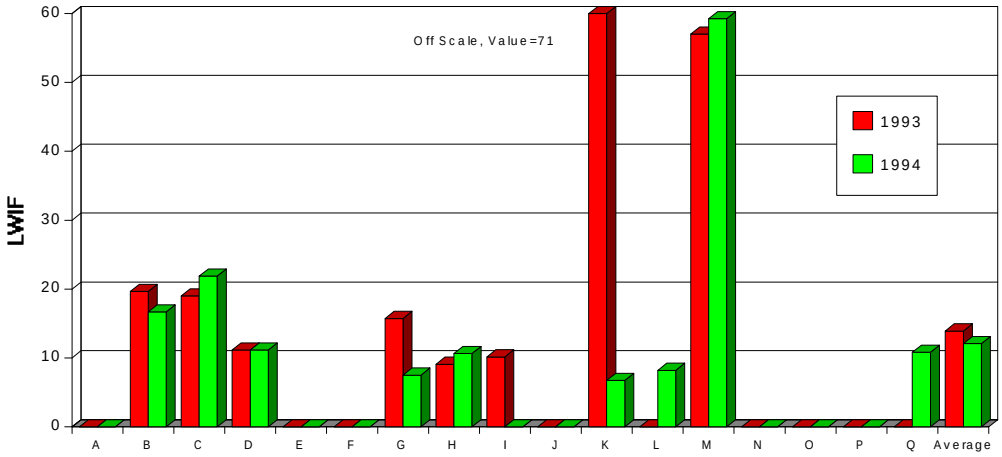


Figure 13 AIF For Contractors in European Oil Industry (Marketing)

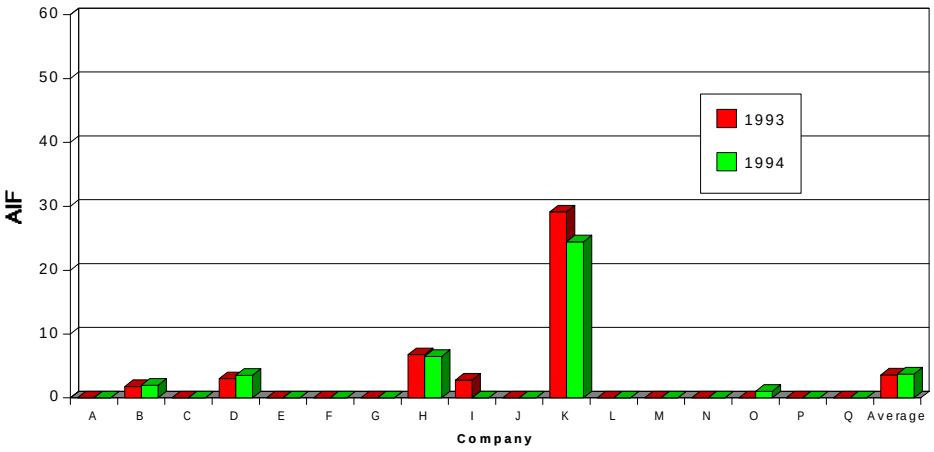


Figure 14 LWIS For Employees in European Oil Industry (Both Sectors***)***

(Days Lost per Incident)

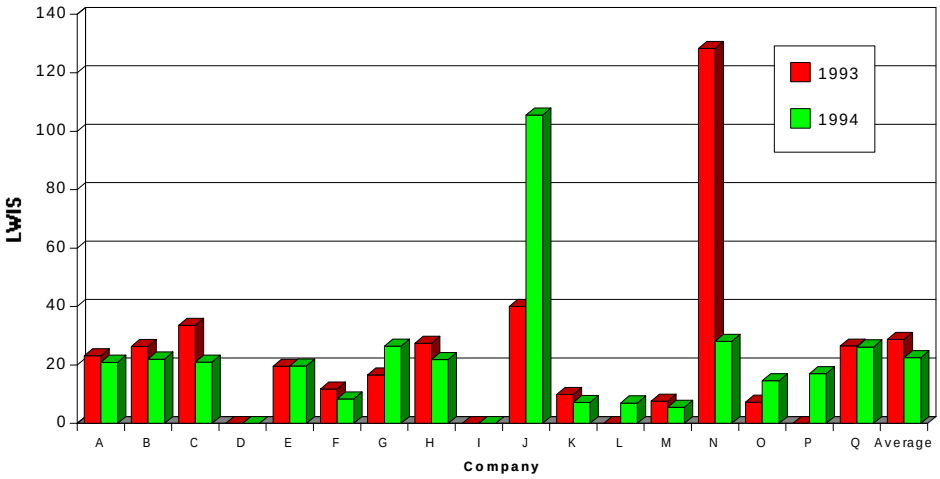
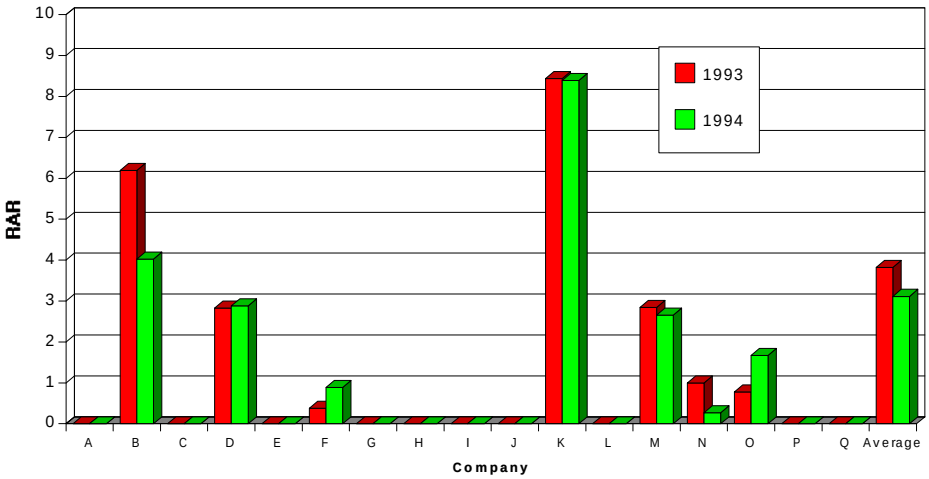


Figure 15 Road Accident Rate

(Accidents per Million Kilometres)



APPENDIX 4 COMPARISON WITH OTHER SECTORS AND AREAS

Table 1 Accident Statistics - 1993

	Exposure	LWIF	Severity	AIF	Fatalities	FAR
CONCAWE						
Refining	112.7	4.4	36.0	12.1	10	8.9
Marketing	243.4	4.8	21.3	6.3	8	3.3
Total	**356.1**	**4.7**	**25.7**	**8.1**	**18**	**5.1**
API						
Refining	116.2	4.6	27.4	20.2	5	4.3
Marketing	29.8	8.7	17.7	16.4	0	0
Total	**146.0**	**5.4**	**24.1**	**19.4**	**5**	**3.4**
E & P Forum						
Europe	**193.8**	**5.2**	**31.0**	**n/a**	**9**	**4.6**
World	**919.2**	**3.9**	**22.0**	**n/a**	**96**	**10.4**

Table 2 Accident Statistics - 1994

	Exposure	LWIF	Severity	AIF	Fatalities	FAR
CONCAWE						
Refining	117.9	3.7	27.1	10.2	5	4.2
Marketing	242.3	4.2	21.5	6.7	15	6.2
Total	**360.2**	**4.0**	**23.2**	**7.9**	**20**	**5.6**
API						
Refining	122.6	4.1	31.2	18.0	3	2.4
Marketing	47.4	6.4	21.5	18.8	1	2.1
Total	**170**	**4.7**	**27.5**	**18.2**	**4**	**2.4**
E & P Forum						
Europe	**173.5**	**4.3**	**32**	**n/a**	**3**	**1.7**
World	**872.0**	**3.4**	**23**	**n/a**	**58**	**6.7**

Exposure is number of hours worked expressed in millions
Severity is the average number of days lost per LWI
FAR (Fatal Accident Rate) is the number of fatalities per 100 million hours worked
API data is for company employees only
CONCAWE and E&P Forum data is for employees and contractors

APPENDIX 5 DATA REQUEST FORM